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WORKING PAPER NO. 02-12
COMPENSATING DIFFERENTIALS AND THE SOCIAL BENEFITS OF THE NFL

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Abstract

We use hedonic rent and wage equations to measure the compensating differentials that obtain in central cities with franchises of the National Football League. We use repeated observations of cities over time and thereby obtain identification of the NFL effect through franchise expansion and movement. We find that rents are roughly 8 percent higher and wages are 4 percent lower in cities with franchises, though the latter of these two effects is not significant. Thus, professional sports franchises appear to be a public good by adding to the quality-of-life in cities. Our findings suggest that once the quality-of-life benefits are included in the calculus, the seemingly large public expenditure on new stadiums appears to be a good investment for cities and their residents.

1. Measuring the Impact of Sports Franchises

Cities, states, and metropolitan areas have on occasion spent large sums of money in an attempt to lure or retain professional sports franchises. These incentives are not necessarily direct payments; they are nearly always an agreement to subsidize construction or renovation of a publicly financed stadium, along with a leasing arrangement that provides substantial amounts of the revenue generated by the stadium to the team itself. Zaretsky (2001) states that at least $5 billion of state and local tax revenue were spent between 1987 and 1999, and projects in the works in 1999 were expected to draw another $9 billion to $11 billion more from public funds. In addition, contracts between these publicly funded facilities and team owners often yield substantial further benefits to the owners by providing them with generous shares of the revenue from parking and concessions. A striking example noted in Leeds and von Allmen (2002) is the case of Eli Jacobs, former owner of the Baltimore Orioles, who, in his bankruptcy proceedings, listed the Orioles stadium lease as his most valuable asset.

What do cities hope to gain in exchange for such concessions? Civic boosters and city officials often think of professional sports as a way of boosting both civic pride and economic activity within a city. A typical statement expressing these sentiments comes from Philadelphia mayor John Street:

> "We are incredibly fortunate to be the home of great professional sports franchises. They enrich our community, fortify our tax base, and provide major support for the region's future economic growth. And then there are the intangible benefits: These Phillies, if we give them our full support, will bring us together; solidify a sense of community with civic pride as they drive toward the pennant." (Street, 2001)

It is fair to say that economists have cast a skeptical eye on the claim that professional sports franchises contribute to the economic health of the surrounding area, regardless of how that surrounding area is defined. At the city level, Coates and Humphreys (1999) examine the correlation between per capita personal income and the existence of sports teams in metropolitan areas and find little evidence that the two are linked. Baade and Sanderson (1997) look at employment rather than income, and while certain sectors closely related to professional sports do show some employment gain, aggregate employment, even allowing for the possibility of Keynesian-type multiplier effects, shows little impact from the existence of sports teams that are, after all, a set of relatively small firms that directly employ a rather small number of people who, while very highly paid, very often do not live year-round in the community. Moreover, the spending that occurs in relation to professional sporting events may result from substituting away from other recreational activities.

Even at a more micro-level, employment benefits in the immediate location of the stadium seem fairly minimal. A number of studies in Noll and Zimbalist (1997) address this issue and find this to be the case (see, for example, Austrian and Rosentraub (1997)).

Yet city boosters and politicians continue to try to make the case for professional sports and the beneficial role they might play in the community. If this beneficial role does not arise from Keynesian-type impacts, it must be because benefits accrue to those who consume professional sports' services. Alexander, Kern, and Neill (2000) attempt to measure the demand and, by extension, the consumer surplus that attendees receive from paying admission to sporting events. One might justify subsidization if the surplus exceeds the city's subsidization of the team. However, these authors do not find that to be the case; the surplus is less than the subsidies.

In arguing the case against the impact of sports teams, our view is that all of these studies miss one basic point: professional sports are, at some level, a nonexcludable public good. It is possible that people obtain benefits from having a sports team even if they never go to see a game. They root for the local athletes, look forward to reading about their success or failure in the newspaper, and share in the city-wide joy when the home team wins a championship.[1] The words of Mayor Street quoted above speak to the "civic pride" that can result from a successful franchise, such that one ought to think of a professional sports team in the way one thinks of a new art museum or new symphony hall or indeed an environmental resource like an old-growth forest — something from which one receives utility just from having it around. Perhaps more important — in the words of Art Modell, controversial owner of the Cleveland Browns-Baltimore Ravens franchise: "The pride and the presence of a professional football team is far more important than 30 libraries" (quoted in Leeds and von Allmen, 2002).

This paper contends that these benefits are measurable via compensating differentials — in the same way that people are willing to pay for other contributors to the quality of life in the area, such as clean air (Kiel and Zabel, 2000; Gyourko and Tracy (1991)). If people like having a professional sports franchise in their community, they are presumably willing to pay for it, if not directly through the purchase of season tickets, then indirectly through an increased willingness to pay for housing in the area, and through an increased willingness to accept marginally lower wages.

The idea that compensating differentials might provide a basis for the social benefit of sports teams was first broached by Rappaport and Wilkerson (2001), who argue that while such differentials may exist, correlations between the presence of sports teams on the one hand and wages and rents on the other will surely be confounded with the correlation between these variables and city size (and perhaps other city-specific characteristics). We confront this issue by relying on a two-period panel of individual data and using city fixed effects to control for all city-specific, time invariant characteristics that contribute to wage and rent determination, including, but not limited to, city size. In the context of a hedonic wage or rent regression, the compensating differential effect of a professional sports franchise is measured by the coefficient of a dummy variable indicating the presence of a franchise in the particular city and year. Given

[1] Though not, hopefully, in the riots that have become all too common on such occasions.

the existence of fixed city effects, the identification of this NFL effect then comes from league expansion and franchise movements into and out of cities over the years between the two panel observations.

Our two dates are 1993 and 1999. We focus our attention on NFL football franchises, for two obvious reasons. The first is the pre-eminent attention the NFL receives among all sports in the United States. The second is that the most serious rival for that attention, Major League Baseball, has had very little expansion in recent years and no franchise movements since the early 1970s. The NFL on the other hand has had a bit more expansion and substantially more franchise movement. Particularly important is the exodus of the NFL from Los Angeles, the nation's second largest metropolitan area, which will help eliminate the contention that our results are related to city size.

We construct hedonic rent and wage equations at the individual level, using data from the Annual Housing Survey for the former and the Current Population Survey for the latter. We control (as noted) for city fixed effects, time fixed effects, a large number of time-varying city characteristics, a large number of individual characteristics, and in the case of the Annual Housing Survey rent equation, a random effect that controls for individual time-invariant characteristics. Despite all of these (and other) controls, we find that the presence of an NFL franchise raises annual rents by approximately 8 percent and that the standard error on the coefficient allows rejection of the usual null hypothesis at any standard level of type I error.

The corresponding coefficient from the wage equation indicates that wages in NFL cities fall approximately 4 percent; however, the coefficient is not significant at the usual levels. Our overall conclusion, nevertheless, is that NFL franchises do contribute to the quality of life.

2. The Rental Equation

We assume that rents for household (i) in city (j) at time (t) can be represented by the following semi-log form:

$$\log R_{ijt} = \alpha_i + \beta_1 X_{ijt} + \beta_2 Z_{jt} + NFL_{jt} + D_j + T + \mu_{ijt} \qquad (1)$$

Where:

$\log R_{ijt}$ = monthly rent paid by household i in city j at time t.

X_{ijt} = a vector of housing characteristics for household i in city j at time t.

Z_{jt} = a vector of time-varying city characteristics j.

NFL_{jt} = dummy variable indicating the presence of an NFL team in city j in year t. Coded with the value 1 if MSA j had a team in year t; if it did not, the value is zero. (Note: this is a single variable.)

D_j = dummy variable for each city coded 1 for a specific city, 0 otherwise.

T = time dummy variable coded 1 if the observation is 1993, 0 if 1999.

$\mu_{ijt} = \alpha_{ijt} + \varepsilon_i$, where $\alpha_{ijt} \sim N(0, \sigma_\alpha^2)$, $\varepsilon_i \sim N(0, \sigma_\varepsilon^2)$.

The error structure suggests an error term with two components. The component α_{ijt} is the traditional error term unique to each observation and is taken to be uncorrelated across observations and uncorrelated through time. The component ε_i is the random disturbance characterizing the ith observation and is constant through time.

Table 1 shows the 32 cities that had an NFL team in either 1993 or 1999. Eight of these cities had a change in NFL team status between 1993 and 1999. Six cities (Baltimore, Charlotte, Jacksonville, Nashville, Oakland, and Saint Louis) did not have an NFL franchise in 1993 but had gained one by 1999. Three cities (Houston, Los Angeles, and Anaheim (Orange County)) hosted an NFL team in 1993, but did not do so in 1999. Twenty-four cities hosted an NFL team in both 1993 and 1999.[2]

Data. We elected to use individual households for the 60 largest MSAs for two time periods: 1993 and 1999. The 60 largest metropolitan areas are chosen because they are the ones most likely to already have or to be in the running for an NFL team. Data for rent and housing characteristics are taken from the *American Housing Survey* (AHS). However, for some of these MSAs, the AHS either did not report observations for any households or the number of household observations was insufficient to be included in our sample. Thus, our final sample consists of almost 6100 rental units in 53 of the 60 largest MSAs for which AHS data are available. Unfortunately, data are not available for two cities that currently have an NFL team: Buffalo and Charlotte. Data are also not available for Green Bay, Wisconsin. In this case we used data for the Milwaukee MSA. Table 2 shows the MSAs used in the study ranked by population size of their CMSAs or MSAs. The New York CMSA is the largest metropolitan area, containing over 20,000,000 people, while the Providence MSA is the smallest, with just under 1,000,000 people in 1999. The mean population size for these metropolitan areas is just under 3,000,000 people.

We performed analyses on both the entire sample and a sample of only the residents of the central city. On the one hand, the real life cost-benefit calculation will often take place at the level of the central city, since that entity often provides the bulk of the metropolitan area's

[2] The Titans played in Memphis in the Liberty Bowl in 1997. They played in Nashville in 1998 and 1999.

subsidy to NFL teams.[3] Second, as pointed out by Gyourko and Tracy (1991), "It is important that the dependent variable (rent) pertain to the same jurisdiction as the right-hand-side fiscal measures." On the other hand, much of the benefit to franchises we are thinking about may accrue to those outside the central city, and indeed, if compensating differentials exist for the entire area, this would provide a justification for subsidization to arise from a broader tax base than the central city alone.

In this paper, we test the hypothesis that presence (or absence) of an NFL team is capitalized in land prices and hence rents. Housing is essentially a bundle of characteristics: bedrooms, bathrooms, local amenities, etc. There is a vast literature on hedonic models applied to housing markets to estimate the implicit prices of the various characteristics.[4] We assume that the systematic portion of rent is determined by a rental unit's physical characteristics and by characteristics of the city in which the rental unit is located. As indicated, the data for rents, R_{ijt}, and housing characteristics, X_{ijt}, are taken from the AHS. Fixed effects (the D_j's in the model) are used to capture the effects on rents due to city-specific characteristics that are time invariant, e.g., nearness to an ocean. In addition, a number of time varying city characteristics, Z_{jt}, are included in the model. These include MSA population size, MSA population growth, unemployment rate, violent crimes per capita, an air quality index (AQI), central city spending per capita, and central city tax per capita.[5]

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[3] While a metropolitan area's suburban residents provide subsidies indirectly via the state government, state subsidies to teams are also financed by state residents who live outside the metropolitan area receiving the subsidy.

[4] Sheppard (1999) provides a thorough review of hedonic analysis of housing markets.

[5] Since PMSAs are treated as MSAs in this study, we refer to them as MSAs. We do not consider consolidated metropolitan statistical areas (CMSAs) in any of the regressions in this study. Population growth between 1980 and 1990 is used for the 1993 observations. Population growth between 1990 and 1996 is used for the 1999 observations. Violent crimes per capita are as reported by the U.S. Federal Bureau of Investigation. The U.S. Environmental Protection Agency (EPA) calculates the AQI for metropolitan statistical areas (MSAs). The EPA uses five major air pollutants regulated by the Clean Air Act: ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, the EPA has established national air quality standards to protect against harmful health effects. The index used in the empirical model of this paper reports on the number of days in

If the NFL placed teams in relatively fast growing cities, our NFL dummy variable could be upwardly biased. Four of the six cities that gained an NFL franchise between 1993 and 1999 had growth rates of their metropolitan population exceeding the national average of 9.6 percent during the period 1990-99 (Charlotte at 22 percent, Nashville at 19 percent, Jacksonville at 16.5 percent, and Oakland at 11.4 percent). Still, two cities that gained an NFL team between 1993 and 1999 had metropolitan population growth rates well below the national average during the period 1990-99 (St. Louis at 3.1 percent and Baltimore at 4.6 percent). In addition, two cities that lost an NFL franchise between 1993 and 1999 had metropolitan population growth rates exceeding the national average (Houston at 20.7 and Los Angeles 10.4 percent). Further, the owners have an economic incentive to seek out the city offering the best stadium deal, since the NFL shares its television and merchandising revenue equally among all teams. (The Rams' move from Los Angeles to St. Louis is a case is point.) Population growth is included as a regressor in the regressions that follow to control for the fact that NLF expansion and movement have some tendency to locate in relatively fast growing metropolitan areas. As it turns out, the NFL and MSA growth variable are negatively correlated (correlation coefficient of –0.1833). Similarly, a relatively low correlation is found between the presence of an NFL team and MSA population size (correlation coefficient of 0.2884).

Table 3 shows the means and standard deviations for all of the variables in the rent regressions, with the exception of the city-specific dummy variables. For example, the time dummy variable was assigned a value of unity if the observation was in 1993, zero otherwise. The table shows that 53 percent of the observations were in 1993. The average unit was about 46

1993 and 1999 that the AQI for a given MSA was greater than 100. Data for both central city spending per capita and central city tax per capita were found in the C*ity and County Data Book*.

years old. The table shows that 68 percent of the households in our sample resided in a city that had an NFL team in either 1993 or 1999.

A pooled cross-section time-series model consisting of 6087 observations forms the basis of the regression analysis. The first column of Table 4 presents the results from the pooled OLS regression. The regression explains 43 percent of the variation in rents. In general, the results are in line with expectations. A few variables, however, have unanticipated signs. The air quality index is positive and significant. Other things equal, we expect rent to be negatively correlated with poorer air quality index. Since we did not control for population density, the positive correlation between air quality and rent may reflect the fact that both air quality and rent are positively correlated with density. We also find that local fiscal variables have the wrong sign. Taxes per capita are positively correlated with rent; however, this variable is not significant. More troubling is the finding that public spending per capita is negative and significant. In some ways these anomalies are not too surprising, since local fiscal variables are notoriously hard to measure. Still, the vast majority of the variables have the anticipated sign and many are highly significant. Most important is the finding that the NFL dummy variable is positive, as expected, and highly significant, suggesting an 8 percent premium on average.

One problem with OLS estimation is that it restricts the constant term (the α_i's) to be identical across individuals in the sample. A fixed effects specification allows for differences across individuals to be captured by differences in the constant term. This specification drops all time-invariant variables, such as the city dummy variables. An alternative is a random effects specification where the component ε_i is the random disturbance characterizing the ith observation and is constant through time. Estimating (1) by OLS assumes that the individual-specific error component is zero, that is, $\sigma_\alpha^2 = 0$. It is well known that if $\sigma_\alpha^2 > 0$, standard errors produced by OLS estimation are downward biased. To test for the appropriateness of OLS versus random effects, we performed the Breusch and Pagan (1980) Lagrangian multiplier test (LM) based on the residuals from the pooled OLS regression for the hypothesis that $\mathrm{H}_0 : \sigma_\mu^2 = 0$ versus the alternative $\mathrm{H}_1 : \sigma_\mu^2 > 0$. For our data LM = 217.42 having a probability value of zero, strongly indicating the presence of an individual-specific error component. The results for the random-effects specification, reported in the second column of Table 4, are very similar to the results from an OLS regression reported in the first column of the table.[6] Most important for our purposes is that the estimated coefficient on the NFL dummy variable is virtually identical in both specifications of the model.

A limitation of the random-effects specification is the assumption that ε_i is uncorrelated with the other regressors. Hausman (1978) proposed a test of this assumption based on the differences between the random-effects and fixed-effects estimates. Since fixed-effects estimation is consistent when ε_i and the regressors are correlated, but the random-effects estimator is not, a statistically significant difference between these two methods is taken as evidence against the random-effects assumption. We performed the Hausman test for our sample and found that we can reject the hypothesis that the coefficients from the two estimations are the same.

Both the OLS and random-effects estimates of equation (1) assume homoskedasticity of the error term, α_{ijt}. The error term may, however, have nonconstant variance. To account for this possibility, both the OLS and random-effects versions were re-estimated using the White robust errors procedure in STATA to take heteroskedasticity into account. The third column of Table 4 reports the findings for the White robust errors procedure for the random-effects version of the

[6] See Greene (1997) for details of the Lagrangian multiplier test. We also ran a fixed-effects version of the model, and the estimated coefficient on the NFL variable is essentially identical to the estimate obtained for that variable in the random-effects estimation.

model.[7] Once again, the findings are very similar to those for the other specifications of the model.

Another issue is that we do not have 6087 independent observation, since each of these observations belongs to one of 53 well-defined clusters (a specific city). Unless there is no correlation within clusters, the usual standard errors calculated by OLS and random-effects estimation are incorrect. Since there is likely to be a city effect that induces correlation among different households within the city, we correct OLS standard errors for cluster sampling, as well as for heteroskedasticity in the next regression and all regressions to follow. The regression reported in the fourth column in Table 4 corrects the standard errors for cluster sampling, as well as for heteroskedasticity. The coefficient on the NFL dummy variable is unchanged (as expected), and it remains highly significant.

Another issue is that some states may have engaged more actively in economic development policies than other states. These states may have been successful in landing an NFL team as well as other types of activity, such as convention centers or business in general. Since these types of state policies affect local growth and local rents, part of the correlation between our NFL variable and rent may be due to a common state effect. To control for this, a state level dummy variable was interacted with the time dummy variable and added to the regression. As indicated, we also corrected the standard errors for cluster sampling, as well as for heteroskedasticity. The results for this regression are given in the final column of Table 4. The findings for this version of the model are consistent with other versions reported in the table. The coefficient on the NFL variable is positive and highly significant, although the value on this coefficient is slightly lower (8.1 percent as opposed to 8.4 percent) than found in previous regressions.

[7] The Huber-White correction for the pooled OLS is available from the authors on request.

With an average monthly rent of almost $500 across cities in the sample, the finding of roughly an 8.0 percent average rental premium implies an implicit price of about $40 per month per unit, or $480 annually in cities hosting an NFL teams. To be on the conservative side, let's consider the lower bound of the amenity premium estimate of 2.9 percent. This implies an implicit price of $14.50 per month per unit, or $174 annually. The average central city in our sample had a population of 753,705 in 1999. According to the *Statistical Abstracts of the U.S.* there were 2.6 people per household in 1999, suggesting there are almost 290,000 households in a typical central city. This implies that the aggregate amenity value to living in a city that hosts an NFL team is about $50 million per year, on average. The average value for hosting an NFL team for 20 years is about $530 million. According to Rappaport and Wilkerson (2001), the public's share of the cost of a new football stadium has averaged $200 million. The lower-bound estimate of the amenity value for hosting an NFL team is obviously well above the public's share of the cost of a new football stadium. Thus, our results suggest that hosting an NFL franchise strongly contributes to the quality of life. While large public expenditures on the construction of new sports stadiums is, and will continue to be, controversial, our findings suggest that once the quality-of-life benefits are included in the calculus, public spending on new stadiums appears to be a good investment for cities and their residents.

While this estimate of the benefit may appear to be large, it's consistent with estimates found in other studies that have quantified the benefits for various types of amenities. For example, Gyourko and Tracy (1991) find that the annual value for just ***one*** extra sunny day is $7 per year per household, and Blomquist et al. (1988) find an annual value of $12. Our average city, with 300,000 households, should be willing to pay between $2.1 million and $3.6 million per year for an extra sunny day.

Rapppaport and Wilkerson (2001) point out that the actions of most cities that lost an NFL franchise tend to place a high valuation on hosting a team. They point out that of the six cities that have lost NFL teams since 1980, "All but Los Angeles subsequently allocated considerably more public financing to attract a new NFL team than it would have cost to keep their old team." For example, voters in St. Louis approved $280 million in public funds to build a new football stadium after the Cardinals departed for Arizona in 1987. St. Louis voters declined to allocate $120 million toward a new stadium when the Cardinals were playing in St. Louis. Rapppaport and Wilkerson take this, and other similar increases in the willingness on the part of cities to increase public funding for new NFL stadiums after losing a team, as evidence that the quality-of-life benefits associated with hosting an NFL team may justify the seemingly large public expenditures.

Evidence from MSA Level Data. Up to this point we have limited our analysis of the quality-of-life benefit to hosting an NFL team to the central city. Obviously, many of the city's suburban residents derive benefits from living in a metropolitan area that's home to a team. This may justify the subsidies given to NFL teams by state governments. Unfortunately, there are not enough observations on suburban rental units in a number of the cities used in this study; Jacksonville and Memphis are two such cases. Since these two cities got teams through expansion in the 1990s, their omission would greatly reduce our ability to measure the quality-of-life benefit to hosting an NFL team. Instead of using the sample of suburban residents, we estimated two additional regressions consisting of the entire MSA sample. The MSA sample gives us an additional 4173 suburban observations for a total sample of 10,260 households. We correct the standard errors for cluster sampling, as well as for heteroskedasticity in both regressions. The findings for these regressions are reported in Table 5. The first regression shown in the table is based on the MSA sample. The findings using the MSA sample are highly consistent with those from the central city sample. The coefficient of the NFL dummy variable indicates that a 7.3 percent rental premium exists in MSAs that host an NFL team, about a percentage point lower than found for this variable when only central city observations were used. Still, the findings for broader MSA samples support the results for central city samples and suggest that hosting an NFL franchise strongly contributes to the quality-of-life in metropolitan areas. In the next regression we added an additional variable that allows the NFL dummy variable to interact with the dummy variable indicating whether a household resides in the MSA's central city (assigned a value of zero) or suburb (assigned a value of unity). This variable should isolate the differential quality-of-life benefit suburban residents receive from the presence of an NFL team. The coefficient on this variable is positive and marginally significant, suggesting that, on average, the amenity benefit derived by suburban residents is greater than that for central city residents, in that it implies a 10 percent rental premium for suburban households.

3. The Effect of NFL Franchises on Wages

The theory of compensating differentials suggests that any amenity that increases the quality of life and pushes up the cost of housing will have a similar, though opposite, effect on wages. A rise in quality of life will (as before) attract new residents and therefore push the supply of labor curve to the right. If the demand for labor in the city is downward sloping, this will cause wages to fall, although in the short to medium run, the demand for labor is perhaps more elastic than the supply of housing, and this may tend to ameliorate the effect. In addition, as Roback (1982) notes, if the amenity is productive, the demand for labor could also be moved to the right, and the effect on wages is ambiguous. It is therefore of interest to measure the effect of NFL franchises on city wages as well.

Our methodology is similar to that employed in the rent equations above. In this analysis we employed the 1993 and 1999 March Supplements to the Current Population Survey and collected information on respondents who live in one of the 60 largest MSAs. This information, summarized in Table 6, includes a number of indicators on the individual demographic and employment characteristics, including binary variables for sex, ethnic group, attainment of a college degree, and veteran status. We also included a large number of dummy variables for employment in various industries and various job classifications. Finally, we also included all of the various MSA characteristics and dummy variables used in the rent equation above. Wages were measured by taking the individual's annual earnings (as reported in the CPS) and dividing by the number of "usual hours worked."[8] Since the MSA represents the local labor market, the wage rate for workers with similar skills and characteristics should be roughly the same in the MSA's central city or suburbs.

The results were imprecise. The results presented in Table 7 are representative of our overall findings for a number of other specifications of the wage regression, which is that MSAs with NFL franchises have lower wages. There is roughly a 4 percent discount to wages in such areas. However, the estimates are not precise enough to warrant the rejection of the null hypothesis that there is no effect at the usual levels of significance — the t-statistic on the NFL variable is –0.97; thus there is only a two-thirds chance that the true coefficient is negative. Other specifications, including sub-sample regressions with just central city or just suburban observations, or including state-time interactions, or just male or just female observations, had slightly higher or slightly lower t-statistics.[9]

[8] Only a small minority of respondents report an hourly wage. Because of this, we elected to use the above measure of the implicit hourly wage.

[9] The cluster weighting and robustness corrections applied to the standard errors in the rent equation are also applied to the wage equation.

While these results are certainly not confirmation of an NFL impact on wages, we view them as mildly encouraging in the following sense. It might be thought that the NFL dummy variable did not represent the effect of NFL teams, *per se,* but some unobserved characteristic correlated with overall growth or economic climate — this despite our fairly careful attempts to control for such unobservables. If this were the case, one might expect such a force to have a positive effect on wages, since the growth probably raises the cost of living.

4. Conclusion

We find that the presence of an NFL franchise raises annual rents approximately 8 percent and that the standard error on the coefficient allows rejection of the usual null hypothesis at any standard level of type I error. The corresponding coefficient from the wage equation indicates that wages in NFL cities fall approximately 4 percent; however, the coefficient is not significant at the usual levels.

Thus we find from the rent results in particular that NFL franchises do add to the quality of life in U.S. metropolitan areas. This, of course, is not the same thing as recommending that cities immediately decide to fund stadiums if only because the opportunity cost of such funds is the elimination of other, possibly more worthy programs.

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Table 1: NFL CITIES in 1993 and 1999		
City	Yes if City Had an NFL team in 1993	Yes if City Had an NFL team in 1999
Arizona (Phoenix)	YES	YES
Atlanta	YES	YES
Baltimore	**NO**	**YES**
Buffalo	YES	YES
N. Carolina (Charlotte)	**NO**	**YES**
Chicago	YES	YES
Cincinnati	YES	YES
Cleveland	YES	YES
Dallas	YES	YES
Denver	YES	YES
Detroit	YES	YES
Green Bay (Milwaukee)	YES	YES
Houston	**YES**	**NO**
Indianapolis	YES	YES
Jacksonville	**NO**	**YES**
Kansas City	YES	YES
Los Angeles	**YES**	**NO**
Miami	YES	YES
Minneapolis	YES	YES
Nashville	**NO**	**YES**
New England (Boston)	YES	YES
New Orleans	YES	YES
New York	YES	YES
Oakland	**NO**	**YES**
Philadelphia	YES	YES
Pittsburgh	YES	YES
Saint Louis	**NO**	**YES**
San Diego	YES	YES
San Francisco	YES	YES
Seattle	YES	YES
Tampa Bay	YES	YES
Washington, DC	YES	YES

Table 2: MSA in Study		
	1999 Metropolitan Area Population	1999 Central City Population
New York	20102875	7428162
Los Angeles	16036587	3633591
Chicago	8885919	2799050
Philadelphia	5999034	1417601
Boston	5901589	555249
Detroit	5469312	965084
Washington, DC	4739999	519000
Houston	4493741	1845967
Atlanta	3857097	401726
Seattle	3465760	537150
Dallas	3280310	1076214
Riverside	3200587	188924
Phoenix	3013696	1211466
Cleveland	2910616	501662
Minneapolis	2872109	353395
San Diego	2820844	1238974
St. Louis	2569029	333960
Baltimore	2491254	632681
Denver	2417908	499775
Oakland	2348723	365210
Pittsburgh	2331336	336882
Tampa	2278169	290973
Miami	2175634	369253
Cincinnati	1960995	330914
Newark	1954671	263087
Kansas City	1755899	437764
Sacramento	1741002	406899
San Francisco	1685647	746777
Milwaukee	1648199	572424
San Jose	1647419	867675
Fort Worth	1629213	502369
San Antonio	1564949	1147213
Norfolk	1562635	225875
Indianapolis	1536665	738907
Fort Lauderdale	1535468	154021
Orlando	1535004	180308
Columbus	1489487	671247
Los Vegas	1381086	418658
New Orleans	1305479	460913
Passaic	1296252	61173
Salt Lake City	1275076	171151
Greensboro	1179384	199562
Nashville-Davidson	1171755	506385
Austin	1146050	587873
Hartford	1113800	128367
Raleigh	1105535	261205
Memphis	1105058	606109
Rochester	1079073	214470
Jacksonville	1056332	695877

Grand Rapids	1052092	185009
West Palm Beach	1049420	76970
Oklahoma City	1046283	475322
Providence	907795	149887

TABLE 3: Means and Standard Deviations of Variables		
Variables from the Annual Housing Survey		
Variable	Mean	Standard Deviation
Log of Rent	6.21	0.47
Time Dummy	0.53	0.50
Building Age	45.73	24.21
Building Age Squared	2676.81	2257.31
Garage Dummy	0.29	0.44
No. of Bathrooms	1.14	0.43
No. of Bedrooms	1.75	0.87
No. of Half-Bathrooms	0.11	0.34
Dummy for Black	0.28	0.45
Minority other than Black Dummy	0.13	0.34
Unit under Rent Control Dummy	0.97	0.30
No. of Rooms	4.15	1.28
Unit Receives Subsidy Dummy	0.002	0.04
Public Sewer Dummy	0.99	0.08
Detached Dummy	0.14	0.35
Low-rise Dummy	0.76	0.43
High-rise Dummy	0.03	0.17
Central Air Conditioning Dummy	0.33	0.47
Holes in Floor Dummy	0.03	0.17
Monthly Electricity Cost	51.35	37.0
Annual Income	19353.4	20585.15
Male	0.50	0.50
CITY/METRO DATA (VARIOUS SOURCES)		
Violent Crimes Per Capita	1760.61	748.62
Air Quality Index	25.07	31.41
Unemployment Rate	7.18	2.65
NFL Status	0.68	0.47
Population Growth	0.043	0.11
Population Size	2356492	2486726
Northeast Dummy	0.25	0.43
West Dummy	0.21	0.41
South Dummy	0.28	0.45

Table 4: Findings for Central City Sample: Rent Equation					
Variable	**Pooled OLS**	**Random Effects**	**Random Effects Hetero Correction**	**Random Effects, Cluster Correction**	**State-time Interactions**
Time Dummy	-0.2688***	-0.2749***	-0.2784***	-0.2688***	-0.0860
Building Age	-0.0061***	-0.0065***	-0.0065***	-0.0061***	-0.0061***
Building Age Squared	0.00004***	0.00005***	0.00004***	0.00004***	0.00004***
Garage Dummy	0.0558***	0.0459***	0.0454***	0.0558***	0.0575***
No. of Bathrooms	0.1209***	0.1049***	0.1070***	0.1209***	0.1215***
No. of Bedrooms	0.0836***	0.0871***	0.0248	0.0836***	0.0831***
No. of Half-Bathrooms	0.0292**	0.0288**	0.0288**	0.0292	0.0283
Dummy for Black	-0.1179***	-0.0991***	-0.1045***	-0.1179***	-0.1181***
Minority other than Black Dummy	-0.0329	-0.0294	-0.0248	-0.0329	-0.0329
Unit under Rent Control Dummy	-0.1036***	-0.0853***	-0.0872***	-0.1036***	-0.1037***
Unit Receives Subsidy Dummy	-0.5950***	-0.5635***	-0.5691***	-0.5950***	-0.5837***
Public Sewer Dummy	0.0644	0.0074	0.0314	0.0644	0.0676
Detached Dummy	-0.0006	0.0045	0.0006	-0.0006	-0.0004
Low-rise Dummy	-0.0757***	-0.0561***	-0.0635***	-0.0757***	-0.0757***
High-rise Dummy	0.0612**	0.0588**	0.0631**	0.0123***	0.0571***
Central Air Conditioning Dummy	0.1767***	0.1785***	0.1776***	0.1767***	0.1763***
Holes in Floor Dummy	-0.1199***	-0.0994***	-0.1026***	-0.1199***	-0.1183**
Monthly Electricity Cost	0.0007***	0.0006***	0.0006***	0.0007***	0.0007***
Annual Income	4.08e-06***	3.43e-06***	3.55e-06***	4.08e-06***	4.08e-06***
Male	-0.0069	-0.0075	-0.0069	-0.0069	-0.0067
Violent Crimes Per Capita	0.00001	3.68e-06	5.33e-06	1.33e-05	7.21e-05
Air Quality Index	0.0008**	0.0008**	0.0008*	0.0008***	0.0002***
Unemployment Rate	0.0133	0.0177*	0.0177*	0.0072*	0.0034
Taxes Per capita	0.00006	-0.00001	-0.0000	-0.0001	-0.0002*
Spending Per capita	-0.0009**	-0.00005***	-0.00006.**	-0.0001***	-0.00001

NFL Status	0.0843***	0.0828***	0.0837***	0.0843***	0.0813***
Population Growth	0.0877	0.0452	0.0547	0.0877	-0.1010
Population Size	9.36e-07***	8.17e-07***	8.34e-07***	9.36e-07***	3.01e-07
Constant	5.27***	5.39***	5.31***	5.27***	5.49***
No. of Obs.	6087	6087	6087	6087 in 53 Clusters	6087 in 53 Clusters
R^2	0.4336	0.4314	N/A	0.4336	0.4359

*, **, and *** denotes significance at the 10 percent, 5 percent, and 1 percent levels respectively.

Table 5: Findings for MSAs: Rent Equation		
Variable	MSA Sample	MSA Sample w/ NFL Interacted w/city - suburban dummy
Time Dummy	-0.1225***	-0.1177***
Building Age	-0.0057***	-0.0057***
Building Age Squared	0.00003**	0.00003***
Garage Dummy	0.0542***	0.0543***
No. of Bathrooms	0.1180***	0.1169***
No. of Bedrooms	0.0856***	0.0860***
No. of Half-Bathrooms	0.0425**	0.0412***
Dummy for Black	-0.1207***	-0.1155***
Minority other than Black Dummy	-0.0255	-0.0240
Unit under Rent Control Dummy	-0.0900**	-0.0863**
Unit Receives Subsidy Dummy	-0.5481***	-0.5521***
Public Sewer Dummy	0.0067	0.01353
Detached Dummy	-0.0010	-0.0029
Low-rise Dummy	-0.0608***	-0.0651***
High-rise Dummy	0.0610***	0.0585***
Central Air Conditioning Dummy	0.1595***	0.1583***
Holes in Floor Dummy	-0.0999***	-0.1009***
Monthly Electricity Cost	0.0005***	0.0004***
Annual Income	3.77e-06***	3.76e-06***
Male	-0.0073	-0.0067
Violent Crimes Per Capita	0.0001***	0.0001**
Air Quality Index	0.00001	-0.0001
Unemployment Rate	0.0122	0.0127
Taxes Per capita	0.0003***	0.0003***
Spending Per capita	-0.0000	-0.0000
NFL Status	0.0731***	0.0615**
NFL Interacted w/Suburban	N/A	0.0395*
Population Growth	0.1769**	0.1840**
Population Size	1.04e-07***	-1.08e-07
Constant	5.69***	5.69***
No. of Obs.	10,260	10,260
R^2	0.4280	0.4208

*, **, and *** denotes significance at the 10 percent, 5 percent, and 1 percent levels respectively.

Table 6: Means and Standard Deviations of Variables		
Variables from the Current Population Survey		
Variable	Mean	Standard Deviation
Executive	0.148477	0.355578
Professional	0.155571	0.362453
Tech	0.03467	0.182946
Sales	0.115465	0.319587
Administration	0.162511	0.368924
Private	0.006695	0.081547
Protection	0.019531	0.138383
Service	0.114636	0.318587
Precision	0.102015	0.302672
Machine Operator	0.055214	0.228402
Transport	0.03553	0.185118
Handlers	0.038417	0.192203
Farm	0.01127	0.105563
Government	0.142089	0.349147
College Degree	0.285561	0.451688
=1 if Male	0.513696	0.49982
=1 if Veteran	0.094184	0.292089
INDUSTRY=agriculture	0.011762	0.107812
Mining	0.001658	0.040689
Construction	0.056566	0.231014
Durable Goods Manuf.	0.089977	0.286153
Nondurable Goods Manuf.	0.058193	0.234112
TPUC	0.076066	0.265107
Wholesale Trade	0.041088	0.198498
Retail Trade	0.167148	0.373114
FIRE	0.074684	0.262884
Business Services	0.072258	0.258918
Personal Services	0.037096	0.189
Entertainment	0.020544	0.141855
Professional Services	0.243367	0.429121
Public Administration	0.049595	0.217109
=1 if black	0.117	0.321426
=1 if Asian heritage	0.044067	0.205247
Hourly wage	13.85284	11.49093
Crime rate index	1664.223	888.1901
Air Quality index	20.54081	23.85109
Per capita taxes	928.4103	905.0618
Per capita expenditure	2105.545	1656.976
Unemployment rate	4.471699	1.773501
Population growth rate	0.086381	0.09792
Population	3722160	2805191
NFL	0.647341	0.477805

Table 7: Results from the Current Population Survey	
Violent Crimes Per Capita	-5.4E-05
Air Quality Index	0.001347**
Unemployment Rate	6.56E-05***
Taxes Per capita	-8.4E-05
Spending Per capita	0.045599*
Population Growth	0.129715
Population Size	-3.58E-08
Age	0.082137***
Age^2	-0.00084***
Attained college degree	0.228125
Male	0.1945***
Veteran	0.015655
Black	-0.0845***
Asian	-0.12077***
NFL	-0.04234
N	32,564
R^2	0.2179

*, **, and *** denotes significance at the 10 percent, 5 percent, and 1 percent levels respectively. The dependent variable is the log of hourly wage. corrected for heteroskedasticity and clustering of observations. Also included were binary variables for industry, job type and MSA of residence.